

MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The REVIEW for September, 1895, is based on reports from 2,760 stations occupied by regular and voluntary observers, classified as follows: 149 from Weather Bureau stations; 35 from U. S. Army post surgeons; 2,416 from State Weather Service and voluntary observers; 34 from Canadian stations; 96 received through the Southern Pacific Railway Company; and 30 from U. S. Life-Saving stations; international simultaneous observations are received from a few stations and

used together with trustworthy newspaper extracts and special reports.

The WEATHER REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by the Division of Records and Meteorological Data, in charge of Mr. A. J. Henry, chief of that division. A special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

The mean temperature was deficient in the extreme southern and northwestern borders, but throughout the greater part of the United States was decidedly above normal. The precipitation was in excess in Oregon and adjacent regions, but was deficient elsewhere. The accumulated precipitation shows a continuance of the drought in the Middle Atlantic, Ohio Valley, Lake, and adjacent regions. The rivers have continued at an unusually low stage of water. The principal storm of the month was that which passed over the Lake Region during the 28th and 29th. As a rule the month was free from general storms of any importance, but severe local storms occurred.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart II. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The mean pressures during the current month were highest over the South Atlantic States, and were also high off the coasts of Washington and Oregon. The highest were: Charleston, 30.11; Knoxville and Chattanooga, 30.10; Fort Canby, 30.07. Mean pressures were lowest in Arizona, and were also low in the Canadian Provinces. The lowest were Battleford, 29.81; Yuma, 29.77.

As compared with the normal for September, the mean pressure was in excess on the south Atlantic and Gulf coasts and on the coasts of upper California, Washington, and Oregon. The greatest excesses were: Charleston, 0.05; New Orleans and Galveston, 0.04; Fort Canby, 0.06. Pressures were deficient

over the northern parts of the interior; the greatest deficits were: Duluth and Port Arthur, 0.11; Winnipeg and Minnesota, 0.10.

As compared with the preceding month of August, the pressures, reduced to sea level, show a fall in southern Florida, southern California, Washington, and in a small region in Montana, North and South Dakota, and Iowa, but a rise over the rest of the country. The maximum rises were: Washington and Northfield, 0.11; Boston, New Haven, New York, Philadelphia, Baltimore, Columbus, Ohio, Cincinnati, Indianapolis, and Louisville, 0.10. The greatest fall was Tatoosh Island, 0.08.

The regular diurnal variation in pressure is shown by the hourly means given in Table V for 28 selected stations out of 67 that maintain barograph records.

AREAS OF HIGH AND LOW PRESSURE.

[By Prof. FRANK H. BIGELOW.]

The tracks of eight areas of high pressure, including the subdivision to number VI, are plotted on Chart IV for the month of September. This chart shows that the centers of high areas linger more persistently near the coast lines than in any other portion of the United States. On the north Pacific Coast there is such an accumulation; also in the neighborhood of the south New England coast; a single high, No. III, hung near the Carolina coast for seven days (September 16 to 23), during which interval the eastern districts were maintained at unusually high temperatures, and a severe drought prevailed. With the exception of No. III, the tracks all lay north of the thirty-fifth parallel.

The tracks of nine low pressure areas are plotted on Chart I, and they are so strictly confined to the northern circuit, near the mean track, that, with one instance excepted (No. VII, for thirty-six hours), they all lie north of the fortieth parallel throughout their course. Six originated near the eastern edge of the high land or the Rocky Mountain Divide,

and two on the north Pacific Coast; all passed eastward over the Lake Region, five of them reaching the Gulf of St. Lawrence.

The month of September was dry, in general; the second half of the month was very warm east of the Mississippi River, though the districts of the Northwest were quite cool, if not below normal. During this period the eastward circulation was stagnant, and the high temperatures of the East were associated with this condition.

Movement of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	1, a. m.	42	39	7, p. m.	47	60	Miles. Days.	Miles.	Miles.	
II.....	4, p. m.	41	125	10, p. m.	41	72	2,210	6.5	340	14.1
III.....	11, a. m.	54	106	23, a. m.	35	73	3,780	6.0	632	25.8
IV.....	13, a. m.	38	124	15, a. m.	46	109	3,640	12.0	303	12.6
V.....	16, a. m.	42	125	17, p. m.	47	131	1,180	2.0	590	24.5
VIa.....	20, a. m.	41	124	25, p. m.	44	67	480	1.5	320	13.3
VIb.....	23, a. m.	41	111	24, p. m.	45	122	4,330	5.5	787	31.7
VII.....	25, a. m.	47	124	29, p. m.	46	60	630	1.5	420	17.4
VIII.....	27, a. m.	50	123	30, p. m.	38	92	3,460	4.5	769	31.9
							1,800	3.5	532	12.1
Sums.....							21,520	42.0	4,683
Mean of 9 paths.....									520	21.6
Mean of 43.0 days.....									500	20.8
Low areas.										
I.....	1, a. m.	51	114	5, a. m.	50	88	1,330	4.0	345	14.3
II.....	4, a. m.	50	109	7, p. m.	47	73	2,380	3.5	680	23.2
III.....	7, p. m.	51	121	13, a. m.	47	62	3,210	5.5	584	24.2
IV.....	11, a. m.	41	124	14, a. m.	45	99	1,840	3.0	613	25.5
V.....	14, p. m.	54	107	19, a. m.	45	63	2,950	4.5	656	25.2
VI.....	17, a. m.	54	105	20, p. m.	49	40	1,710	3.5	482	20.3
VII.....	20, p. m.	39	104	24, a. m.	47	60	2,510	3.5	717	25.8
VIII.....	23, p. m.	52	114	27, p. m.	48	61	2,560	5.0	512	21.8
IX.....	27, a. m.	47	109	30, p. m.	48	66	2,380	3.5	680	23.2
Sums.....							20,920	36.0	5,276
Mean of 9 paths.....									586	24.3
Mean of 36.0 days.....									581	24.1

HIGH AREAS.

I.—The month of September opened with a large high area covering the central valleys, the Atlantic States, and the Rocky Mountain Slope, central near the southern end of Lake Michigan. The barometer was relatively low over the Gulf of St. Lawrence and over the extreme northwestern districts, but there was no well-defined storm center in the rear of the high. Rain was falling along the Atlantic Coast from Maine to Florida, though the weather was fair in the interior. The temperature had fallen in the Lake Region and risen in the upper Missouri Valley. The high moved slowly eastward to the Virginia coast by the 2d, then northward to New England on the 3d, 4th, and 5th, and thence to the Gulf of St. Lawrence on the 6th and 7th. Its eastward progress was accompanied by light rains in the Gulf States from the 1st to the 3d. After that the rain area formed on the western side of the high in the Mississippi Valley, and crossed the Ohio Valley and the Middle States on the 4th, 5th, and 6th, and also the southern portion of New England, on the 7th. The temperature variations were all slight in the eastern districts during this time.

II.—This area of high pressure formed on the Pacific Coast in Oregon on the 5th, crossed the mountains in Washington on the 6th, moved to Iowa on the 7th, Pennsylvania on the 8th, and dissipated in New England on the 10th. Rain fell in the northern Rocky Mountain Plateau, as it advanced eastward, during the 5th and 6th; also showers occurred in the Gulf States on the 7th, on the south Atlantic Coast on the 8th, 9th, and 10th, but fair weather prevailed in most States during this period. A temperature fall of 10° to 20° accom-

panied the high in the mountain slope on the 6th, and in the Lake Region on the 7th. Frosts were reported in Montana, South Dakota, and Nebraska on the morning of the 7th, being the earliest of the season, but they did not extend eastward beyond the Missouri Valley.

III.—The next high area was one of remarkable duration, namely, from the 11th to the 23d. It commenced in Manitoba, moved down the Red River Valley to Lake Superior on the 13th, to the New Jersey coast on the 15th, to the South Carolina coast on the 16th, where it continued, with some uncertain motions, till the 23d. The formation of the high in Alberta produced showers in Montana and North Dakota on the 11th, but the weather became fair in front of the high till the 12th, p. m., when slight precipitation set in on the 13th in the Ohio Valley, but again cleared up in a few hours. After the high reached the Atlantic Coast, on the 15th, rain set in on its northwestern border, in the Lake Region, the low pressure configuration being poorly defined. This followed the south-eastward movement of the high, and covered the Ohio Valley on the 16th, touching the Atlantic Coast on the 18th. A second area of rainfall passed along the northern border of this high on the 18th and 19th, falling for the most part in the Middle and the southern New England States. From the 11th to the end of the month a severe drought covered the States east of the Mississippi and south of the Ohio River, during which a moderately high barometer prevailed, with dry, hot winds from the south and southwest. Cooler air, with precipitation, passed eastward to the north of this high in a series of three waves, covering the Lake Region and the Middle and New England States, with the usual weather changes. The maximum temperatures ranged above 90° for several successive days (19th to 25th) in the south Atlantic and the Gulf States.

IV.—This high formed on the middle Pacific Coast during the 13th, crossed the mountains to Montana, where it disappeared on the 15th. It showed no noteworthy features.

V.—A feeble high covered the north Pacific Coast districts during the 16th and 17th, influencing the weather conditions inappreciably, except to produce a few light showers on the 16th.

VI.—This high formed on the middle Pacific Coast on the 20th, and, crossing the United States, arrived at the Atlantic Coast on the 25th. On the 22d it subdivided in Utah, the subordinate VIb passing northwest to the Pacific Coast on the 24th, while at the same time VIa was approaching the New England States. VIa passed to the Columbia River Valley on the 20th, to Utah on the 22d, Oklahoma on the 23d, Pennsylvania on the 24th, and Maine on the 25th; VIb moved from Utah on the 22d, Idaho on the 23d, and Oregon on the 24th. On the 21st and 22d a trough, with precipitation, formed in front of the high and covered the Missouri Valley, together with the south-central Slope. The rain advanced with the high and fell in the Mississippi Valley generally on the 23d, but the high passed eastward with no further rainfall of importance. Decided temperature falls occurred in the Rocky Mountain Region on the 20th, in the Missouri Valley on the 21st, the southern Slope on the 22d, the upper Mississippi Valley and the Lake Region on the 23d, and New England on the 24th, but failed to reach the heated territory south of the Ohio Valley. Killing frosts occurred in the Missouri Valley on the morning of the 23d, and in the Lake Region on the 24th.

VII.—This is another high area that traversed the United States. It formed in Washington on the 25th, moved to Nebraska on the 26th, Lower Michigan on the 27th, the mouth of the St. Lawrence River on the 28th, and Nova Scotia on the 29th. It caused some precipitation in the lower Mississippi Valley on the 26th, when it was central in Nebraska; also some frost in the lower Missouri Valley on

the 27th. Its passage eastward was marked by clear weather in all the districts east of the Mississippi on the 28th, with frosts in the lower Lake Region and Ohio Valley. On the 29th a low followed in its rear, with precipitation in the eastern Lake Region. Lower temperatures were experienced generally throughout the Northern States on the 26th, and these spread to the South Atlantic States and New England on the 28th.

VIII.—The last high area of the month originated in British Columbia on the 27th, and moved to eastern Montana on the 28th, eastern Nebraska on the 29th, and Missouri on the 30th, where it was at the end of the month. A low with limited precipitation formed in front of this high in the upper Missouri Valley on the 27th; the entire system drifted eastward; rain fell in the upper Mississippi Valley on the 28th, the eastern Lake districts on the 29th, and New England and the Middle States on the 30th. A decided fall of temperature took place on the mountain slope and the upper Mississippi Valley on the 28th, generally east of the Mississippi and also in the extreme Southwest on the 29th, and the Atlantic Coast States on the 30th. This high produced frosts in the lower Missouri Valley on the 29th, with an extensive frost area covering the upper Mississippi Valley, the Lake Region, and as far south as Kentucky on the 30th.

It may be noted that the tendency for rain to fall in showers in the midst of the high areas during the summer months is, in September, much more closely confined to the edges of the highs. Whenever two contiguous highs encounter each other the combined action generally causes cyclonic movements of the low areas with precipitation, but the fundamental causes of rainfall are doubtless harmonious throughout the year, whether the location of rain be in the midst of a high area or on its periphery, or in the region of the counterflow between the two adjacent highs. The inference to be drawn is, that lows are, on the whole, such formations as to be strictly dependent upon the previous existence of high areas.

AREAS OF LOW PRESSURE.

I.—The first center of low pressure for September appeared north of Montana near the one hundred and fifteenth meridian on the 1st, and moved to North Dakota on the 2d, to Lake Superior on the 4th, where it dissipated on the 5th. A few isolated showers occurred near the northern boundary, but the cyclonic area was generally dry till the 4th, when rain fell in the upper Mississippi and Ohio valleys on the 4th and 5th. This precipitation was so far to the southeast of the center as to be more properly referred to the high area to the east of it. The temperature changes were unimportant.

II.—The next low area appeared quite near the same place as the preceding one on the 4th; moved to Nebraska on the 5th, to Lake Superior on the 6th, and to the middle St. Lawrence Valley on the 7th, where it died away. This area was also quite dry till the 6th, when showers and thunderstorms occurred in the upper Mississippi Valley, which extended eastward to the Middle States on the 7th, in a limited area. This low had very little influence upon the local temperatures.

III.—The third area appeared to the north of Washington on the 7th, advanced to South Dakota by the 9th, to Wisconsin on the 11th, and then it moved rapidly to New Brunswick on the 12th, disappearing to the north of Nova Scotia on the 13th. Like many storms of this season its progress to the Mississippi Valley was nearly free from rainfall. On the 11th a general rain occurred in Montana and North Dakota, in the rear of the storm, at which time a high developed rapidly in that locality. Rain fell in the lower Lake Region and New England on the 12th after the center reached the St. Lawrence Valley. Some ground may be taken for the interpretation that this eastern part of the low track was to a con-

siderable extent an independent formation. An area of warmer temperature followed the eastward movement of this low, with local rises of from 10° to 20°.

IV.—This low appeared on the California coast on the 11th, crossed the mountains near the Columbia River Valley on the 12th, and disappeared in South Dakota on the 14th. An extensive rain fell in the north Pacific States on the 11th to the 13th, the precipitation extending to the northern Plateau on the 14th. This storm had no influence on the weather conditions east of the Missouri Valley.

V.—The next low first appeared in Alberta on the 14th, and lingered for two days in the same vicinity. It then moved rapidly to Minnesota on the 17th, to New Jersey on the 18th, and disappeared in Nova Scotia on the 19th. This arrived in the Mississippi Valley without precipitation, three days after formation, after which its advance up the Ohio Valley and over New England was accompanied by quite heavy rains in Ohio, New York, and Pennsylvania, on the 18th and 19th, with some showers in southern New England.

VI.—Appeared in Alberta on the 17th, moved west to the Mountain Divide on the 18th, turned back to North Dakota on the 19th, and died out near Lake Superior on the 20th. Some rain fell to the north and west of the center on the 19th. During the 20th a second development took place in Kansas, being a part of the same trough of low area, which is described in the following number.

VII.—This center lingered near western Kansas during the 20th, 21st; moved to Lake Superior on the 22d; to the mouth of the St. Lawrence on the 23d, breaking up in the Gulf on the 24th. It carried a long area of precipitation over the Missouri and Mississippi valleys on the 21st, 22d, and 23d, though in many instances the showers were very light. The usual slight temperature changes followed its movements.

VIII.—This appeared first in Alberta on the 22d, moved slowly eastward to Lake Superior by the 26th, and then very rapidly to the Gulf of St. Lawrence by the 27th. This showed the same characteristic position of the rain, as regards the center, seen in cyclonic areas of the Northwest, viz, a fall to the rear (24th and 25th), followed by a sudden transference to the front (26th), in the Ohio Valley, while the storm was central over the upper Lakes. On the 26th thunderstorms were general in Missouri and the lower Lake Region. The passage of this area was attended by an average increase of 10° to 15° in temperature in the northern belt.

IX.—This low formed in Montana on the 27th, moved to upper Michigan on the 28th, and to New Brunswick on the 30th. In this case light precipitation adhered quite closely to the central portions of the area of depression throughout the movement, except on the 30th, when it extended southward into the middle Atlantic States. The changes in temperature were insignificant.

X.—The last low appeared in Alberta on the 29th and was in the Red River Valley on the 30th, at the end of the month. No features of interest developed.

The month of September was one of unusual quietness as regards the atmospheric circulation. No hurricane developed in the West Indian region; the Southern States were not visited by any storm; and the movements of highs and lows in the northern circuit were very simple.

LOCAL STORMS.

By Mr. A. J. HENRY, Chief of Division of Records and Meteorological Data.

On the afternoon and night of the 3d, a heavy rain, generally accompanied by wind, lightning, and hail, fell over central Indiana and Illinois, eastern Missouri, and southeastern Iowa. At Indianapolis the losses by floods were estimated as high as \$100,000, exclusive of injury to public works. Nearly 7 inches of water fell within eleven hours. Business streets were flooded and families rescued from drowning by the

police. At many other towns the rain was heavy. In the country districts corn was swept to the ground, outbuildings were leveled, farm animals drowned and killed by lightning, which also destroyed stacks and barns. At Peoria, Ill., the storm was mentioned as the most severe of many years. At Bloomington the rainfall during the night exceeded 6 inches; sewers were choked and streets and basements overflowed; in the vicinity cattle were killed and buildings and stacks burned by lightning. At New London, Mo., hail fell during nearly two hours; some of the masses weighed 8 ounces, and the destruction of glass was large. At Clinton, Iowa, and in the surrounding country the storm was furious, and the losses by hail and lightning were serious.

From the evening of the 3d to the morning of the 4th an area of low pressure covered the northern Lakes, while a subsidiary depression covered Kansas. These two disturbances changed their relative positions but little during the continuance of the rainstorms above described.

On the 6th, at Baltimore, occurred the heaviest rainfall that had visited that city in twenty-five years. From 2 o'clock a. m. to 6 o'clock p. m., there was little cessation. For the sixteen hours the record of precipitation was 4.76 inches. Streets were flooded, one woman and a team of horses were drowned, and buildings thrown down and made dangerous by the undermining of the foundations. There was little wind and no thunder or lightning. The damages are roughly estimated at \$100,000. A cloudburst near Glenn Falls Station, 23 miles from the city, carried away the railroad embankment for a long distance, and made the west branch of the Patapsco (ordinarily a few feet in width) a torrent an eighth of a mile wide, which inundated fields and destroyed the crops for several miles along the valley of the river.

The excessive precipitation above referred to was not confined to Baltimore alone, but was common to a considerable portion of Maryland. In Washington, and elsewhere on the borders of Maryland, the rainfall was light.

On the afternoon of the same day the worst storm of wind, rain, thunder, and lightning visited Joplin, Mo., that the town had experienced since 1875. Streets and houses were flooded and occupants of the latter driven out, a large water main was burst, mines were filled, and trains could not reach the city over the submerged tracks for several hours. Similar storms prevailed at Macon, Mo., Girard and Fort Scott, Kans., St. Paul, Minn., and Water Valley, Miss. In the vicinity of the latter town serious damage was done to corn and cotton.

In the afternoon of the 8th southeastern Kansas was swept by a wind and rain storm of almost unprecedented force; several lives were lost and much property destroyed. In Gridley, Coffey County, a village of 400 inhabitants, many of the best buildings were wrecked and but four were uninjured. This was the work of the wind, and the contents of the ruined structures were quickly soaked by rain. The storm raged from the north to the line of the county, destroying churches, houses, barns, and granaries. At Emporia, a wing of the State Normal School was ruined, entailing a loss of \$25,000. Considerable injury was also wrought to business buildings. The rainfall during the night is reported at 8 inches. The Neosho Valley for ten miles above Emporia was flooded, fields of shocked corn and thousands of tons of hay in stacks were washed away and the inhabitants driven to higher ground. Elk City was inundated, houses were washed away and hundreds left homeless. Neosho Rapids was flooded and fine business structures were ruined. Fort Scott, Fredonia, Independence, and many smaller towns and their surrounding farms suffered severely. In seven counties buildings, railroads, and highways were injured.

It may be added that in the three storm periods thus far described the greatest destruction by wind, rain, and light-

ning occurred in a region far removed from the area of least pressure, commonly known as the storm centre.

On the 11th Cape Vincent, N. Y., experienced a terrific storm, attended by thunder and lightning. The railroad roundhouse and station were blown down killing 2 persons and injuring 14 others. Several business blocks were unroofed, buildings were set on fire by lightning, and rain washed away roads and flooded cellars. A similar, though less destructive storm, prevailed at Watertown, a few miles distant. At and near Turner's Falls, Massachusetts, "a cloudburst of hail" covered the ground to a depth of 2 feet with hailstones, many of them "as large as a man's fist." In a territory about 1 mile by 6, windows were riddled and all exposed vegetables destroyed. Duluth, Minn., and vicinity was also visited by a rainstorm reported to be the heaviest ever before known in that locality.

On the 10th, 11th, and 12th, rain fell in a dozen California counties largely devoted to the cultivation of grapes, prunes, and apricots. The storm was unexpected, being unusually early, and threatened to damage both wine and raisin grapes, and all drying fruit. But the unfavorable conditions were not lasting and serious losses did not follow.

At Madison, Wis., on the 15th, a purely local wind overturned a train of empty freight cars, injuring three men seriously. Large trees were uprooted and other small damages resulted. A similar storm accompanied by rain, was reported from Chicago. Small craft on the lake were endangered and 2 lives were lost. The rainfall for an hour was violent, and lightning did slight damage.

The storm that prevailed along the Lake region, excepting Lake Michigan, on the night of the 17th, was exceedingly violent over Michigan counties bordering on Lake Huron. In Huron county 2 children were killed by the falling of a house torn to pieces by wind, and the destruction of buildings reached many thousand dollars without considering the losses of live stock, fences, standing grain, telephone lines, and trees. At Huron City the storm was "the heaviest ever known by the oldest inhabitant." In the counties of Charlevoix, Grande Traverse, Kalkaska, Emmet, and Alpena, the damage wrought was also extensive, though no lives were lost. In Grande Traverse county, fruit orchards, maple sugar bushes, and an 80-acre tract of timber were swept almost clear of trees. Late in the evening a furious storm burst upon Pittsburg. It lasted less than half an hour, but in that period wind and lightning had killed 2 persons and destroyed much valuable property. An immense grain elevator was wrecked, loss \$20,000, and scores of smaller buildings were demolished. Damages to boating were estimated at \$10,000.

This storm passed rapidly eastward, the rain front reaching the Atlantic Ocean twenty-four hours after the appearance of the storm centre in North Dakota.

In its progress eastward a condition favorable to the development of tornadoes was apparently reached in several portions of its path, especially in central Michigan and in the vicinity of New York City. At the last named place pressure fell two-tenths of an inch in fifteen minutes, the wind suddenly shifted from southeast to south and increased from 8 to 48 miles per hour; it soon backed to southeast then to northeast and north with diminishing velocity. Marked fluctuations of pressure were also observed at Albany, Philadelphia, Baltimore, and Washington. At the two stations last named thunderstorms occurred, beginning at 9.15 and 9.40 a. m., respectively, and the barometric changes were those characteristic of thunderstorms. At the other stations named, however, the barograph curve formed almost a perfect V. While light rain fell there were no thunderstorms. The rain front continued to move eastward through Connecticut and Massachusetts, although the eastward progress of thunderstorms was apparently stopped on a line parallel with the

Hudson River. Other unusual features in connection with the progress of this storm eastward from central Michigan were the continuance of thunderstorms throughout the night hours, and the termination of all thunderstorm activity during the daytime of the 18th, at a time when the local heat, due to sunshine, would appear to have been favorable to their continuance.

On the 20th a snowfall of two inches, and continuing at 8.30 p. m., was reported at Deadwood, S. Dak.; Lander, Wyo., where it continued until 8 o'clock, p. m., of the 21st; and at Ogden, Utah.

Snow fell quite generally over Colorado on the night of the 21st, reaching a depth of from 4 to 12 inches. Serious injury was done to fruit trees by breaking the limbs. Most of the fruit was saved. During the night snow also fell in western Nebraska.

On the night of the 22d a violent storm destroyed property, mostly on farms, estimated in value at \$35,000, in the Wisconsin counties of Lincoln and Eau Claire. Other sections of the State also suffered badly in the demolition of houses and telegraph lines. At Oconto the storm is reported as the most severe since 1871. On the same night a wind storm damaged miscellaneous property valued at \$10,000 in Menominee, Mich., and at Alpena, Mich., the wind registered a velocity of 71 miles.

Destructive gales swept over Lakes Superior, Huron, and Michigan on the 28th and 29th. Their coming had been forecast by the United States Weather Bureau office, at Chicago, and serious losses were doubtless thereby prevented. Snow fell in Michigan on the 29th to the depth of several inches in many localities on the upper peninsula, and at a few points in the southern part of the State. Snow was also reported at Lima, Ohio, and at Altoona and Philadelphia, Pa.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau.

The *monthly mean temperature* published in Table I, for the regular stations of the Weather Bureau, is the simple mean of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *regular diurnal period* in temperature is shown by the hourly means given in Table IV for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution* of the monthly mean temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart II; the lines are drawn over the high irregular surface of the Rocky Mountain Plateau, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map. The highest mean temperatures were: Yuma, 84.2, and Key West, 82.0. The lowest mean temperatures were: in the United States, Port Crescent, 49.1, and in Canada, Calgary, 42.6.

As compared with the normal for September, the mean temperature for the current month was deficient in the extreme southern part of the Florida Peninsula, and in the Pacific Coast, northern Rocky Mountain, and northern Slope regions. The largest excesses were: Dubuque, 7.4; La Crosse, 7.2; Omaha, 6.8; Concordia, 6.5; Wichita and Topeka, 6.2; Des Moines and Columbus, Ohio, 6.0. The greatest deficits were: Walla Walla, 7.0; Calgary, 6.9.

Considered by districts the mean temperatures for the cur-

rent month show departures from the normal as given in Table I. The greatest positive departure was Upper Mississippi, 5.5. The greatest negative departure was northern Plateau, 4.0.

The years of highest and lowest mean temperature for September are shown in Table I of the REVIEW for September, 1894. The mean temperature for the current month was the highest on record at: Harrisburg, 69.6; La Crosse, 67.6; Dubuque, 69.8; Des Moines, 69.4; Omaha, 71.2; North Platte, 67.4; Concordia, 73.4; Topeka, 73.1; Dodge City, 72.7; Wichita, 75.2; Kansas City, 73.2; Parkersburg, 73.0; Lexington, 72.8; Raleigh, 75.9; Knoxville, 74.8; Nashville, 75.9; Memphis, 77.8; Little Rock, 78.0; Chattanooga, 75.3; Columbia, 77.6; Atlanta, 76.5; Montgomery, 80.0; Pensacola, 80.6; Mobile, 80.7; New Orleans, 81.7; Palestine, 80.5. It was the lowest on record at: Port Angeles, 50.7; Walla Walla, 58.3; Astoria, 56.2; Roseburg, 57.2; Carson City, 54.8.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: Yuma, 107 (7th); Concordia, 104 (16th); Huron and Sioux City, 103 (17th); Omaha, 102 (17th); Pierre, (9th), North Platte, (17th), 101; Rapid City (13th), Dodge City (5th), Wichita and Palestine (12th), 100. The lowest maxima were: Port Angeles, 62 (28th); Tatoosh Island, 64 (28th); Pysht, 65 (1st); Port Crescent, 66 (28th); East Clallam, 67 (28th). The highest minima were: Key West, 71 (10th); Titusville, 70 (18th); Jupiter, 68 (4th); Tampa (17th), and Port Eads (30th), 66. The lowest minima were: Lander, 7 (22d); Winnemucca, 16 (22d); Williston, 17 (29th); Havre and Carson City, 18 (22d); Idaho Falls, 19 (22d).

The *limit of freezing weather* is shown on Chart VI by the isotherm of minimum 32°, and the limit of frost by the isotherm of minimum 40°.

The years of highest maximum and lowest minimum temperatures are given in the last four columns of Table I of the current REVIEW. During the present month the maximum temperatures were the highest on record at: Northfield, 90; Albany, 97; Nantucket, 86; New London, 93; Woods Hole, 84; Vineyard Haven, 91; Harrisburg, 94; Lynchburg, 99; Norfolk, 100; Cape Henry, 96; Hatteras, 90; Wilmington, 96; Raleigh, 98; Charlotte, 98; Port Huron, 94; Cincinnati, 95; Lexington, 95; Parkersburg, 96; Columbia, 96; Palestine, 100; Dodge City, 100; Concordia, 104; Denver, 96; Cheyenne, 90; North Platte, 101; Omaha, 102; Rapid City, 100; Huron, 103; St. Paul, 96; La Crosse, 97; Green Bay, 95; Dubuque, 97; Bismarck, 96. The minimum temperatures were the lowest on record at: Tampa, 66; Shreveport, 44; Fort Smith, 37; Springfield, Mo., 37; Springfield, Ill., 36; Kansas City, 37; Topeka, 33; Concordia, 29; Wichita, 34; Dodge City, 30; Pueblo, 28; Denver, 27; Cheyenne, 20; Salt Lake City, 29; Lander, 7; Miles City, 22; Williston, 17; Havre, 18; Helena, 26; Walla Walla, 36; Portland, Oreg., 36; Astoria, 40; Eureka, 36; Winnemucca, 16; Carson City, 18; Fresno, 44.

The *greatest daily range of temperature and the extreme monthly range* are given for each of the regular Weather Bureau stations in Table I, which also gives data from which may be computed the extreme monthly ranges for each station. The largest values among the greatest daily ranges were: Miles City, 56; Moorhead, 54; Williston, 53; Winnemucca, 49; Lander, Pueblo, and Carson City, 48. The smallest values were: Corpus Christi, 13; Hatteras, 14; Galveston and Port Eads, 15; Key West and Titusville, 17; Jupiter and Woods Hole, 18; Kittyhawk, 19; Charleston and Tatoosh Island, 20. Among the extreme monthly ranges the largest values were: Lander and Huron, 81; Williston, 78. Sioux City, 76; Concordia and North Platte, 75. The smallest values were: Key West, 19; Titusville, 20; Jupiter, 21; Tatoosh Island, 24; Tampa and Port Eads, 25; Corpus Christi, 26.